

Microsoft
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Running the Commercialization Rapids with New Technology

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Session Outline

- Why Model Technology Adoption?
- Technology Adoption Waterfall
 - Riding the Commercialization Rapids
- A Few Examples
 - Server and Client Computers
 - Internet
- Mapping Current Technology Trends
 - 64-bit Computing
 - Multi-core Processors
 - Virtualization
- What Have We Learned?

Why Model Technology Adoption?

- Create a visual representation of market trends
 - Useful for evaluating adoption over a span of time
- Gain insights from past adoption cycles
 - Lessons from both successes and failures
- Track the progress of emerging technology
 - Respond to changes in adoption patterns
- Identify changing marketing dynamics
 - Make corrections to keep on course

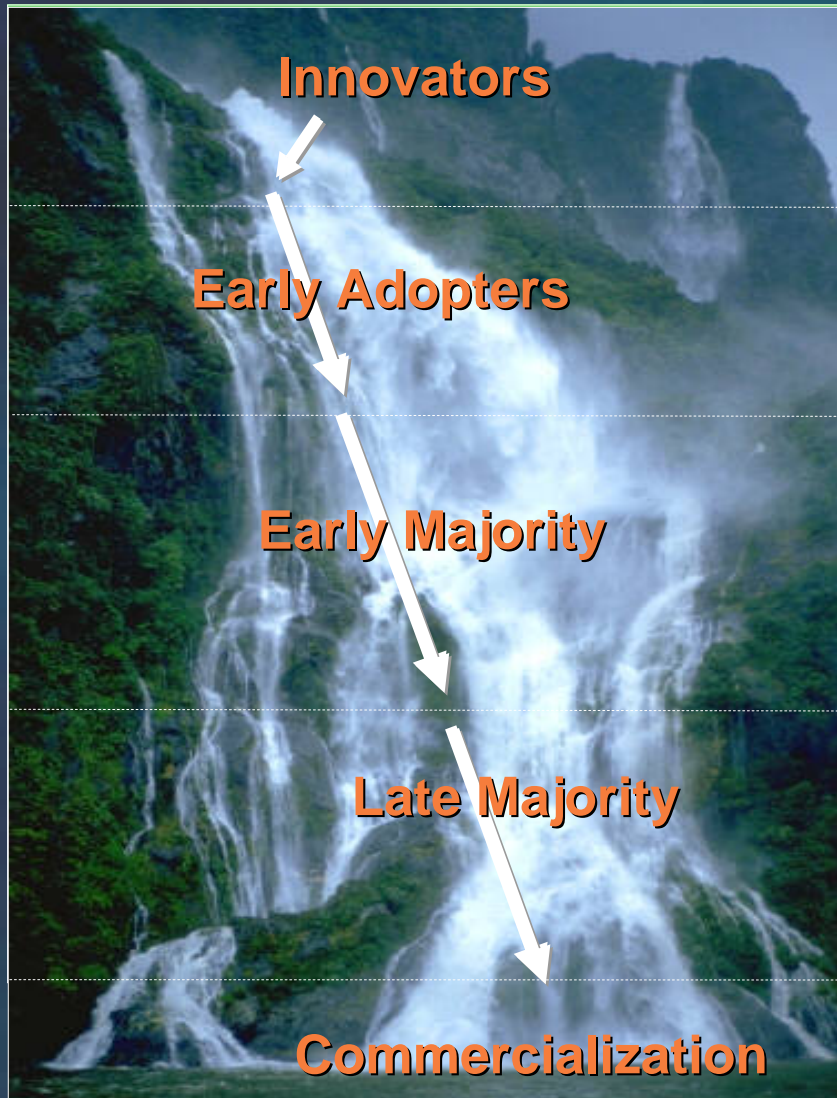
Technology Adoption Waterfall

Riding the Commercialization Rapids



- General model that is widely applicable
- Must “cross over” at each segment
- Not all technologies “ride the rapids” to become mainstream

Technology Adoption Waterfall



Groundbreakers who help to open up a new line of technology

Visionaries who are ahead-of-the-curve in their attitudes and behaviors

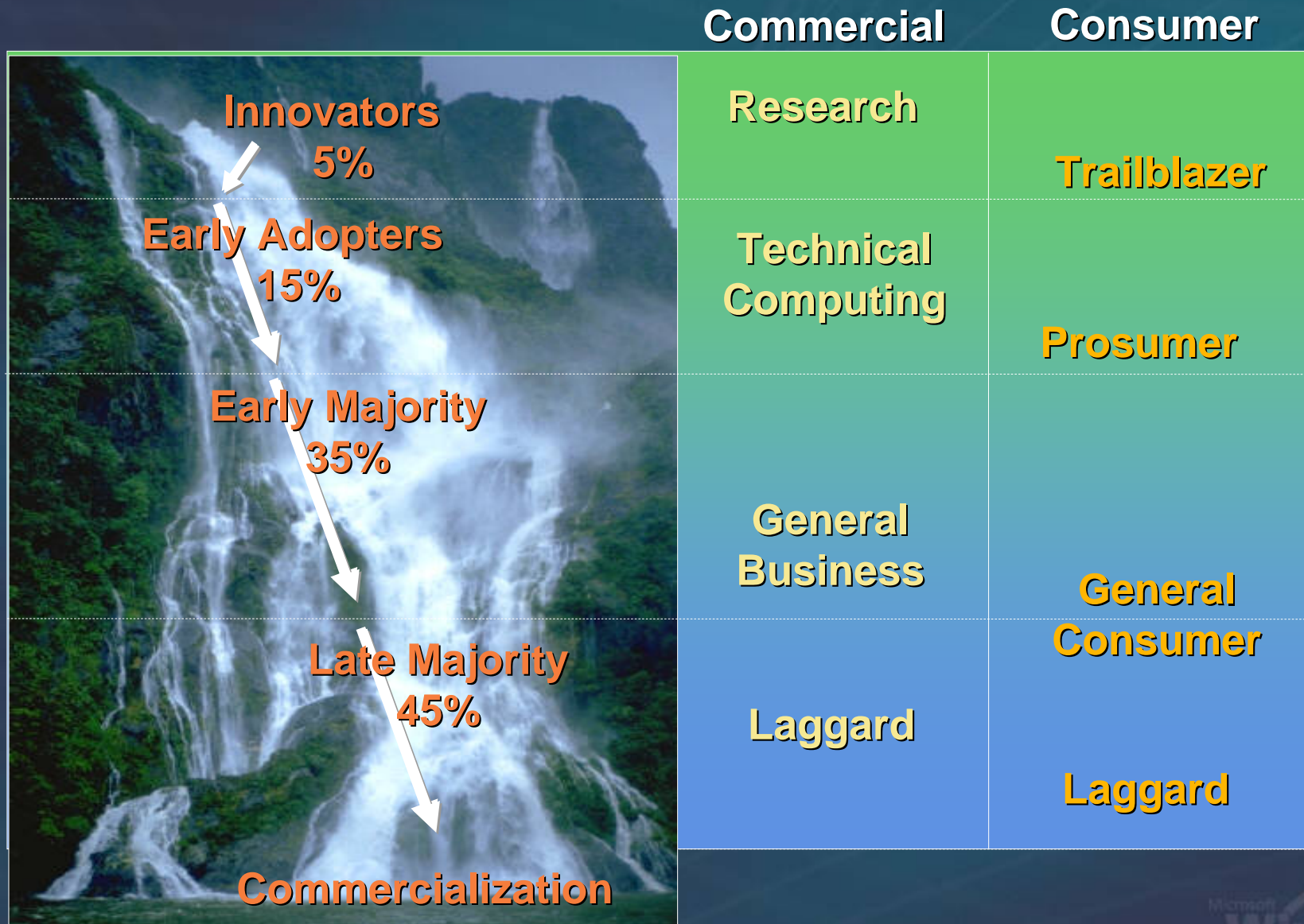
Pragmatists who are more process-oriented but willing to invest in new technology

Skeptics who have a more negative attitude toward technology

Technology Adoption Waterfall

- **Innovators**
 - Enthusiasts willing to try new technology
 - Provide valuable first experiences
- **Early Adopters**
 - Can be convinced to try new technology
 - Supply initial success stories
- **Early Majority**
 - Need references and guidance to try new technology
 - Want safety measures to guard against failure
- **Late Majority**
 - Extremely cautious in trying new technology
 - Need proof points to accept product's value

Technology Adoption Waterfall



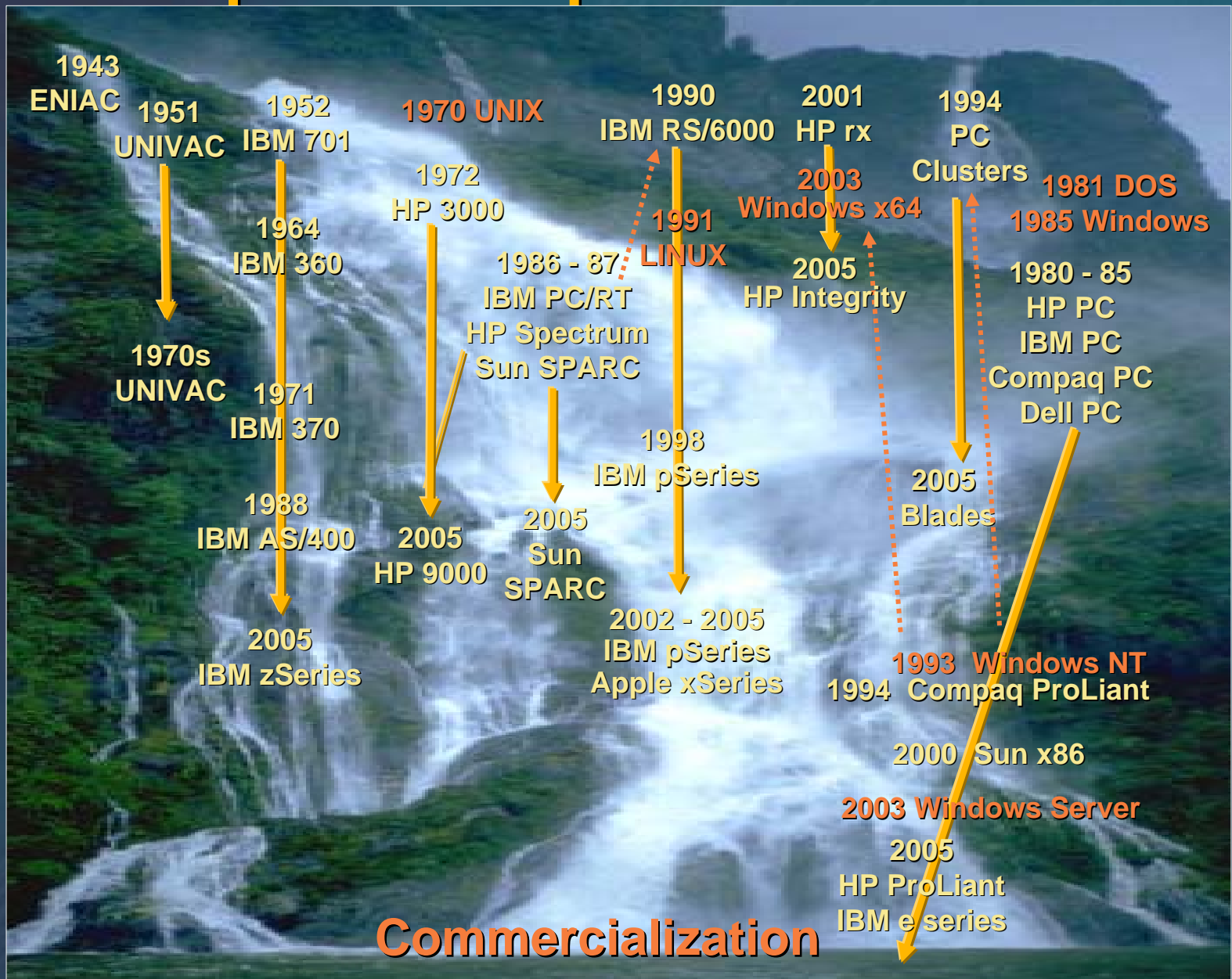
A Few Examples - Computers - Servers

Innovators

Early Adopters

Early Majority

Late Majority



A Few Examples - Computers - Servers

- First uses of computers by innovators
 - ENIAC - ballistics firing tables
 - UNIVAC - predict 1952 presidential election
- IBM is major driver to commercial acceptance
- New technologies can opt to start at the top
 - IBM Power and Itanium systems
- Not all technologies survived the waterfall
 - Examples: UNIVAC
- Operating systems offer major inflection points
 - UNIX a driver from early adopter to early majority
 - Windows a major influence in driving to late majority

A Few Examples - Computers - Clients

Innovators

Early Adopters

Early Majority

Late Majority



A Few Examples - Computers - Clients

- Innovators were engineers and scientists
 - Initial use was as a hobbyist (DIY) or engineering tool
- Form factor has always been a driving force
- Apple continues move to commercialization with niche market and/or special focus products
- The influence of a standard operating system (Windows) and open hardware platform (x86) enabled adoption by broader audience
- Commercialization is based on continued evolution of client in terms of
 - Form factor
 - Specialized functions

A Few Examples - Internet

Innovators

Early
Adopters

Early
Majority

Late
Majority

1969 - ARPANET → 4 hosts

1972 - ARPANET → 23 host

1983 - TCP/IP becomes protocol → 500 hosts

1984 - Domain Name Service introduced

1990 - ARPANET decommissioned

1991 - Gopher search and retrieval tool

1991 - World Wide Web is launched → 25 million users

1993 - Mosaic graphical browser

Commercial providers can sell to individuals

1994 - Netscape 1.0

1995 - First wireless Internet demo → 4 million hosts

1996 - MSFT Internet Explorer

**Feb. 2005 there are 814 million
users or 12.7% of world population**

Commercialization

A Few Examples - Internet

- How do you count commercialization - worldwide or developed countries?
 - 12.7% worldwide - but near domination in developed countries
- Microsoft Explorer - dominant design emerges
 - Driving acceptance to late majority in developed countries
- For worldwide commercialization - internet access needs to get even easier
 - 50 x 15 effort by AMD is an example

Emerging Technology - 64-bit Computing

Innovators

Early
Adopters

Early
Majority

Late
Majority



Emerging Technology - 64-bit Computing

- Logical evolution in computing
 - Innovators pushing against 32-bit memory limitations
 - Technical applications, Gaming systems, Graphics, Database
- 64-bit hardware began to appear in 1990's
 - RISC successful in pushing to early majority
 - Took 10 years for x86-based processors to catch up
- Entering the era of pervasive 64-bit computing
 - Windows x64 major inflection point
 - AMD and Intel shipping 64-bit hardware as mainstream
- Adoption based on running a 64-bit OS
 - How well platform runs OS can be differentiating factor

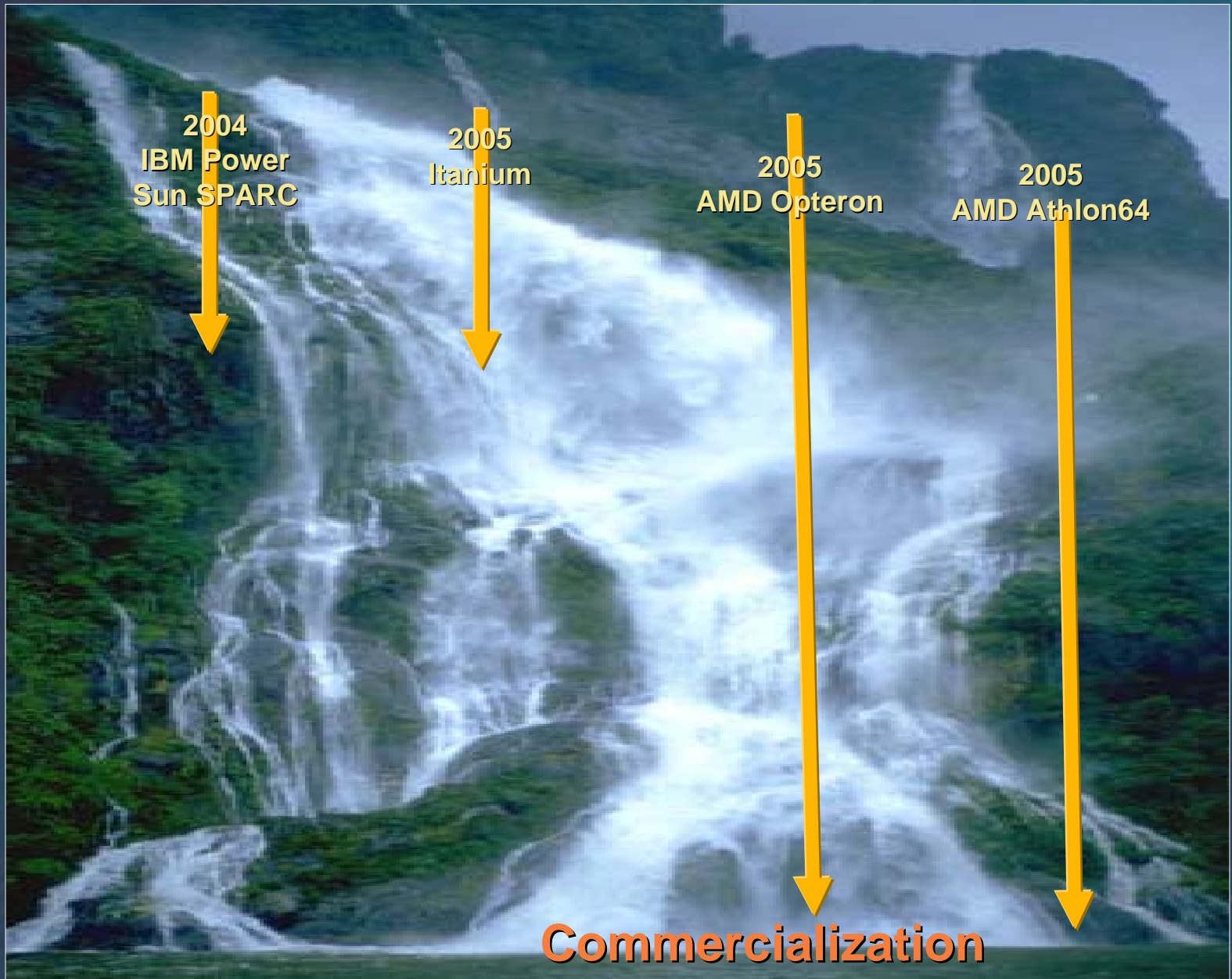
Emerging Technology - Multi-Core

Innovators

Early
Adopters

Early
Majority

Late
Majority



Emerging Technology - Multi-Core

- Multi-core RISC, EPIC, and x86-based processors are emerging at the same time
 - x86-based processors are not the lagging follower
- Early in the adoption cycle
 - Initial acceptance is critical to good adoption
 - Performance and software licensing major concerns
- Multi-core promises to improve performance and efficiency of multi-threaded environments
 - RISC systems grew up running a multi-threaded application
 - X86-based systems have learned to expertly juggle multiple single applications

Emerging Technology - Virtualization

Innovators

Early Adopters

Early Majority

Late Majority



Emerging Technology - Virtualization

- Innovators used virtualization to solve resource utilization issues of mainframe environment
 - IBM made virtual machine standard for their mainframes
 - Sun made partitioning a core component of SPARC/Solaris
- As x86-based servers move to commercialization, virtualization technology has begun to emerge
 - Matching feature set of mainframe and RISC
 - Striving for better resource utilization
- Microsoft purchased Connectix to integrate virtualization directly into Windows
 - Following mainframe/RISC approach of tight coupling of OS and hypervisor or resource manager

Call To Action

- Can you speed-up the waterfall?
 - Yes, Internet adoption showcases what happens when right inflection points hit at the same time
- Are there exceptions to the flow?
 - Yes, recently, mass market as tech driver - certain client devices poised for acceptance outside of flow
- Will early adopters continue to strongly influence general technology direction?
 - True in case of 64-bit - already moving from early adopters to early majority
 - For virtualization - need to see how fast we will move from early adopters to early majority
 - Dual core will be a case to track

Additional Resources

- Web Resources:
 - 50 x 15: <http://50x15.amd.com/home/default.aspx>
 - Internet statistics:
<http://www.internetworldstats.com/stats.htm>
 - **Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers**
by [Geoffrey A. Moore](#)
 - Diffusion of Innovation Theory
http://www.ciadvertising.org/studies/student/98_fall/theory/honor/paper1.html

questions

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